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[home](#) | [Module 5 Labs](#) | Lab 3 - OSPF

Lab 3 - OSPF

Lab 3: IP routing protocol lab—OSPF

The physical topology is as shown in Figure 15–3.

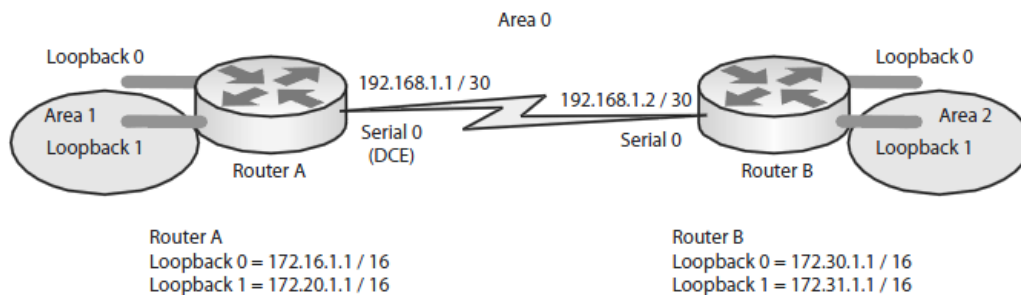


Figure 15–3: OSPF lab

Lab exercise

Your task is to configure the network in Figure 15–3 to allow full connectivity using the OSPF routing protocol. Please feel free to try the lab without following the lab walk-through section.

Text printed in a monospaced font indicates commands that can be entered on the router.

Purpose

OSPF is a highly robust and scalable protocol and by far the most popular with medium-to-large companies. A good working knowledge of the protocol is vital to your success in the exam and as a Cisco engineer.

Lab objectives

1. Use the IP addressing scheme depicted in Figure 15–3. The student who is using router A needs to configure a clock rate on interface serial 0: set this to 64000.
2. Set telnet access for the router to use the local login permissions of username "banbury" and the password "ccna".
3. Configure the "enable password" to be "cisco".
4. Configure the OSPF routing protocol to advertise all networks attached to the router.
5. Ensure the routing information is correct by checking the routing table for entries of your neighbor's addresses.
6. Finally, try to ping all loopback interfaces of your neighbor, and then try to access your neighbor router via telnet.

Lab walk-through

1. To set the IP addresses to an interface, you will need to do the following:

```

Router#config t
Router(config)#hostname RouterA
RouterA(config)#
RouterA(config)#interface serial 0
RouterA(config-if)#ip address 192.168.1.1 255.255.255.252
RouterA(config-if)#clock rate 64000 « If this is the DCE side
RouterA(config-if)#no shutdown
RouterA(config-if)#interface loopback 0
RouterA(config-if)#ip address 172.16.1.1 255.255.0.0
RouterA(config-if)#interface loopback 1
RouterA(config-if)#ip address 172.20.1.1 255.255.0.0
RouterA(config-if)#^Z
RouterA#
  
```

```

Router B:
Router#config t
  
```

```

RouterA(config)#
RouterB(config)#hostname RouterB
RouterB(config)#
RouterB(config)#interface serial 0
RouterB(config-if)#ip address 192.168.1.2 255.255.255.252
RouterB(config-if)#no shutdown
RouterB(config-if)#interface loopback 0
RouterB(config-if)#ip address 172.30.1.1 255.255.0.0
RouterB(config-if)#interface loopback 1
RouterB(config-if)#ip address 172.31.1.1 255.255.0.0
RouterB(config-if)#^Z
RouterB#

```

2. To set the clock rate on a serial interface (DCE connection only), you need to use the "clock rate #" command on the serial interface, where # indicates the speed:

```
RouterA(config-if)#clock rate 64000
```

Ping across the serial link now.

3. To set telnet access, you need to configure the VTY lines to allow telnet access: to do this type (from configuration mode):

```

RouterA(config)#line vty 0 4 « Enters the VTY line configuration
RouterA(config-line)#login local « This will use local usernames
                             and passwords for telnet access
RouterA(config-line)#exit « Exit the VTY config mode
RouterA(config)#username banbury password ccna « Creates username
                             and password for telnet access (login local)

```

```

Router B:
RouterB(config)#line vty 0 4
RouterB(config-line)#login local
RouterB(config-line)#exit
RouterB(config)#username banbury password ccna

```

4. To set the "enable password" do the following:
RouterA(config)#enable secret cisco « Sets the "enable password" (encrypted)

Router B:

```
RouterB(config)#enable secret cisco
```

5. To configure OSPF on a router there are two steps: first, enable the routing protocol; and second, specify the networks to be advertised by OSPF:

```

RouterA(config)#router ospf 20 « Enables the OSPF routing process
RouterA(config-router)#network 172.20.0.0 0.0.255.255 area 1
RouterA(config-router)#network 192.168.1.0 0.0.0.3 area 0
RouterA(config-router)#network 172.16.0.0 0.0.255.255 area 0
                             « Specifies the networks for OSPF to advertise; one network
                             statement is needed for every network advertised.

```

```

Router B:
RouterB(config)#router ospf 20
RouterB(config-router)#network 192.168.1.0 0.0.0.3 area 0
RouterB(config-router)#network 172.30.0.0 0.0.255.255 area 0
RouterB(config-router)#network 172.31.0.0 0.0.255.255 area 2

```

You should see a console message telling you that the OSPF adjacencies have been formed. For the command to take you should come out of config mode with the ^Z or type "exit" twice.

```

RouterB#
02:38:57: %SYS-5-CONFIG_I: Configured from console by console
02:38:59: %OSPF-5-ADJCHG: Process 20, Nbr 172.20.1.1 on Serial0 from
LOADING to FULL, Loading Done

```

Use the "show ip route" command to determine if the networks being advertised by your neighbor's OSPF process are in your routing table.

```

RouterA#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area * - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

```

Gateway of last resort is not set

```

C    172.16.0.0/16 is directly connected, Loopback0
C    172.20.0.0/16 is directly connected, Loopback1
    172.31.0.0/32 is subnetted, 1 subnets
O IA  172.31.1.1 [110/65] via 192.168.1.2, 00:01:33, Serial0
    172.30.0.0/32 is subnetted, 1 subnets
O    172.30.1.1 [110/65] via 192.168.1.2, 00:01:33, Serial0
    192.168.1.0/30 is subnetted, 1 subnets
C    192.168.1.0 is directly connected, Serial0
RouterA#

```

You can issue a "show ip protocols" command to check on the OSPF configuration.

```
RouterA#show ip protocols
```

```
Routing Protocol is "ospf 20"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 172.20.1.1
  It is an area border router
  Number of areas in this router is 2. 2 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    172.16.0.0 0.0.255.255 area 0
    172.20.0.0 0.0.255.255 area 1
    192.168.1.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    172.31.1.1       110           00:05:48
    172.20.1.1       110           00:05:48
  Distance: (default is 110)
```

```
RouterA#
```

6. To test connectivity you will need to use the ping command, and to logon to your neighbor's router you need to use the telnet command:

```
RouterA#ping 172.30.1.1 « This will send a ping packet to the
                        address specified; there should be
                        five replies if everything is OK
```

```
RouterA#ping 172.30.1.1
```

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 28/31/32 ms
RouterA#
```

```
RouterA#telnet 172.31.1.1 « This will open a telnet connection to
your neighbor's router. If telnet access has been set up
correctly you should be presented with a login message.
```

```
RouterA#telnet 172.31.1.1
Trying 172.31.1.1 ... Open
```

User Access Verification

```
Username: banbury
Password:
RouterB>exit
```

```
[Connection to 172.31.1.1 closed by foreign host]
RouterA#
```

```
RouterA#show ip ospf neighbor
```

Neighbor	ID	Pri	State	Dead Time	Address	Interface
172.31.1.1	1	FULL/	-	00:00:29	192.168.1.2	Serial0

Test the following commands also:

```
show ip ospf database
show ip ospf interface
debug ip ospf packet
```

```
Router B:
Do the same with router B:
RouterB#ping 172.16.1.1
RouterB#ping 172.20.1.1
RouterB#telnet 172.16.1.1
```

7. Now please enter reload at the "Router#" prompt and type "yes".

Show runs

```
RouterA#show run
Building configuration...
```

```
Current configuration : 867 bytes
!
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname RouterA
!
enable secret 5 $1$rujI$BJ8GgiK8U9p5cdfXyApPr/
!
```

```

.
username banbury password 0 ccna
!
ip subnet-zero
!
interface Loopback0
 ip address 172.16.1.1 255.255.0.0
!
interface Loopback1
 ip address 172.20.1.1 255.255.0.0
!
interface Ethernet0
 no ip address
 shutdown
!
interface Serial0
 ip address 192.168.1.1 255.255.255.252
 clockrate 64000
!
interface Serial1
 no ip address
 shutdown
!
interface BRI0
 no ip address
 shutdown

!
router ospf 20
 log-adjacency-changes
 network 172.16.0.0 0.0.255.255 area 0
 network 172.20.0.0 0.0.255.255 area 1
 network 192.168.1.0 0.0.0.3 area 0
!
ip classless
no ip http server
!
line con 0
 password letmein
 login
line aux 0
line vty 0 4
 login local
!
end

RouterA#

---

RouterB#show run
Building configuration...

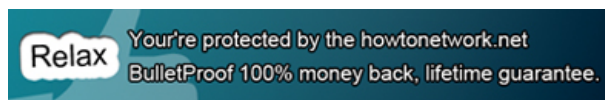
Current configuration : 853 bytes
!
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname RouterB
!
enable secret 5 $1$ydeA$MyfRKeV0ckjm7w/0ornnB1
!
username banbury password 0 ccna
!
ip subnet-zero
!
interface Loopback0
 ip address 172.30.1.1 255.255.0.0
!
interface Loopback1
 ip address 172.31.1.1 255.255.0.0
!
interface Serial0
 ip address 192.168.1.2 255.255.255.252
!
interface Serial1
 no ip address
 shutdown
!
interface Ethernet0
 no ip address
 shutdown
!
interface BRT0

```

```
interface eth0
no ip address
shutdown

!
router ospf 20
log-adjacency-changes
network 172.30.0.0 0.0.255.255 area 0
network 172.31.0.0 0.0.255.255 area 2
network 192.168.1.0 0.0.0.3 area 0
!
ip classless
no ip http server
!
line con 0
password letmein
login
line aux 0
line vty 0 4
login local
!
end
```

RouterB#



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